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Shirley Browne, Jack Dongarra, Stan Green, Keith Moore, Theresa Pepin, T  
August 1995 ACM SIGSOFT Software Engineering Notes , Proceedings of the  
Volume 20 Issue SI

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Additional Information: full citation, abstract, refere

A location-independent naming system for network resources has been d  
description of software components accessible through a virtual distribut  
easy and efficient searching and retrieval, and it addresses many of the  
involved with distributed software repositories by providing mechanisms  
and integrity checking. This paper ...

## 2 Resource discovery protocol for mobile computing

Charles E. Perkins, Harry Harjono  
December 1996

Mobile Networks and Applications, Volume 1 Issu

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The increasing complexity of modern networks prompts a need for dyna  
the additional need to rediscover the location of local area network resou  
We present a protocol and proposal for the operation of dynamic resourc  
and light weight. We implemented and tested our design with stationary  
IP.

1

### Location-independent naming for virtual distributed software repositories

Shirley Browne, Jack Dongarra, Stan Green, Keith Moore, Theresa Pepin, Tom Rowan, Reed Wade

August 1995

ACM SIGSOFT Software Engineering Notes , Proceedings of the 1995 Symposium on Software reusability,  
Volume 20 Issue SI

Full text available: pdf(894.55 KB)

Additional Information: full citation, abstract, references, citings, index terms

A location-independent naming system for network resources has been designed to facilitate organization  
and

description of software components accessible through a virtual distributed repository. This naming system  
enables easy and efficient searching and retrieval, and it addresses many of the consistency, authenticity,  
and

integrity issues involved with distributed software repositories by providing mechanisms for grouping  
resources

and for authenticity and integrity checking. This paper ...

2

### Resource discovery protocol for mobile computing

Charles E. Perkins, Harry Harjono

December 1996

Mobile Networks and Applications, Volume 1 Issue 4

Full text available: pdf(246.43 KB)

Additional Information: full citation, abstract, references, citings, index terms

The increasing complexity of modern networks prompts a need for dynamic resource discovery. Mobile  
clients

have the additional need to rediscover the location of local area network resources each time they move to a  
different LAN. We present a protocol and proposal for the operation of dynamic resource discovery. Our  
design is

simple, extensible, and light weight. We implemented and tested our design with stationary servers, and  
mobile

clients running mobile IP.

3

### Scalable Networked Information Processing Environment (SNIPE)

Graham E Fagg, Keith Moore, Jack J Dongarra, Al Geist

November 1997

Proceedings of the 1997 ACM/IEEE conference on Supercomputing (CDROM)

Full text available: pdf(77.42 KB)

Additional Information: full citation, abstract, references, citings

SNIPE is a metacomputing system that aims to provide a reliable, secure, fault-tolerant environment for  
long-term distributed computing applications and data stores across the global InterNet. This system  
combines

global naming and replication of both processing and data to support large scale information processing  
applications leading to better availability and reliability than currently available with typical cluster  
computing

and/or distributed computer environments.

Keywords: MetaComputing, RCDS, SNIPE, reliable, scalable, secure

4

Position papers: Supporting longevity in an information infrastructure architecture

Christos A. Papachriston

September 1996

Proceedings of the 7th workshop on ACM SIGOPS European workshop: Systems support for worldwide applications

Full text available: pdf(637.52 KB)

Additional Information: full citation, abstract, references

With the growth in the Internet and network-based community, comes an interest in building applications independently of the information or data on which they will operate. In conjunction with this divergence of information from application and significant growth in the amount of information available on the net the issues

of longevity are taking a more prominent position. As investment in information grows, the amount of information that has long-term value also grows. The URLs (Uniform Resource ...

5

Types and persistence in database programming languages

Malcolm P. Atkinson, O. Peter Buneman

June 1987

ACM Computing Surveys (CSUR), Volume 19 Issue 2

Full text available: pdf(7.91 MB)

Additional Information: full citation, abstract, references, citings, index terms, review

Traditionally, the interface between a programming language and a database has either been through a set of relatively low-level subroutine calls, or it has required some form of embedding of one language in another. Recently, the necessity of integrating database and programming language techniques has received some long-overdue recognition. In response, a number of attempts have been made to construct programming languages with completely integrated database management systems. These lang ...

6

A case for document management functions on the Web

Gail L. Rein, Daniel L. McCue, Judith A. Slein

September 1997

Communications of the ACM, Volume 40 Issue 9

Full text available: pdf(415.20 KB)

Additional Information: full citation, references, citings, index terms

7

Referential integrity of links in open hypermedia systems

Hugh C. Davis

May 1998

Proceedings of the ninth ACM conference on Hypertext and hypermedia : links, objects, time and space---structure in hypermedia systems: links, objects, time and space---structure in hypermedia systems

Full text available: pdf(1.30 MB)

Additional Information: full citation, references, citings, index terms

8

Morphology & tagging: Morphology with a null-interface

Harald Trost, Johannes Matiassek

August 1994

Proceedings of the 15th conference on Computational linguistics - Volume 1

Full text available: [pdf\(553.76 KB\)](#)

Additional Information: full citation, abstract, references, citings

We present an integrated architecture for word-level and sentence-level processing in a unification-based paradigm. The core of the system is a CLP implementation of a unification engine for feature structures supporting relational values. In this framework an HPSG-style grammar is implemented. Word-level processing

uses X2MORF, a morphological component based on an extended version of two-level morphology. This component is tightly integrated with the grammar as a relation. The advantage ...

9

Pearl: a probabilistic chart parser

David M. Magerman, Mitchell P. Marcus

April 1991

Proceedings of the fifth conference on European chapter of the Association for Computational Linguistics

Full text available: [pdf\(622.92 KB\)](#) [Publisher Site](#)

Additional Information: full citation, abstract, references, citings

This paper describes a natural language parsing algorithm for unrestricted text which uses a probability-based

scoring function to select the "best" parse of a sentence. The parser, Pearl, is a time-asynchronous bottom-up chart parser with Earley-type top-down prediction which pursues the highest-scoring theory in the chart, where

the score of a theory represents the extent to which the context of the sentence predicts that interpretation. This parser differs from previous attempts at stochastic ...

10

Session V: Flexible parsing

Phil Hayes, George Mouradian

June 1980

Proceedings of the 18th conference on Association for Computational Linguistics

Full text available: [pdf\(699.04 KB\)](#) [Publisher Site](#)

Additional Information: full citation, abstract, references, citings

When people use natural language in natural settings, they often use it ungrammatically, missing out or repeating words, breaking-off and restarting, speaking in fragments, etc., Their human listeners are usually able

to cope with these deviations with little difficulty. If a computer system wishes to accept natural language input

from its users on a routine basis, it must display a similar indifference. In this paper, we outline a set of parsing

flexibilities that such a system should provide. ...

Reuse library interoperability and the World Wide Web

Shirley V. Browne, James W. Moore

May 1997

ACM SIGSOFT Software Engineering Notes , Proceedings of the 1997 symposium on Software reusability,

Volume 22 Issue 3

Full text available: pdf(1.16 MB)

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## Resource discovery protocol for mobile computing

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Volume 1 , Issue 4 (December 1996) tab

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ISSN:1383-469X

[Authors](#)Charles E. Perkins IBM T. J. Watson  
Harry Harjono Columbia Univ., N[Publisher](#)

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### ↑ ABSTRACT

The increasing complexity of modern networks prompts a need for dynamic resource discovery. We present a protocol and proposal for the operation of dynamic resource discovery that is extensible, and light weight. We implemented and tested our design with stationary and mobile IP.

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Note: OCR errors may be found in this Reference List extracted from the full text article. ACM has only correct and linked references.

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Mike Esler , Jeffrey Hightower , Tom Anderson , Gaetano Borriello, Next century computing: networking for invisible computing: the Portolano project at the University of Washington, annual ACM/IEEE international conference on Mobile computing and networking, p. 1-10, Seattle, Washington, United States

## ↑ INDEX TERMS

### Primary Classification:

C. Computer Systems Organization

↳ C.2 COMPUTER-COMMUNICATION NETWORKS

## C.2.1 Network Architecture and Design

↳ Subjects: Wireless communication

**Additional Classification:**

C. Computer Systems Organization

↳ C.2 COMPUTER-COMMUNICATION NETWORKS

↳ C.2.2 Network Protocols

↳ Subjects: Applications (SMTP, FTP, etc.)

↳ Nouns: IP

H. Information Systems

↳ H.3 INFORMATION STORAGE AND RETRIEVAL

↳ H.3.3 Information Search and Retrieval

↳ Subjects: Search process

**General Terms:**

Algorithms, Design

↑ **Collaborative Colleagues:**

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## Supporting personal mobility for nomadic computing over the internet

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Volume 1 , Issue 1 (April 1997) table

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### ↑ ABSTRACT

This paper presents a new paradigm for nomadic computing over the Internet called (UPC), where mobile users can access computing resources, network services, and environments anywhere using any available terminals. The concept of UPC and system architecture are discussed, and the required system architecture capable of managing different mobile terminals, in the UPC environment is presented. Modifications of connection setup application programs to enable addressing based on a global user identity are con-

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Mária Törö , Thong Tri Huynh , Jinsong Zhu , Kangming Liu , Victor C. M. Leung, CORBA based des personal computing, Mobile Networks and Applications, v.8 n.1, p.75-86, February 2003

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### 141 Intrusion detection techniques for mobile wireless networks

Yongguang Zhang, Wenke Lee, Yi-An Huang

September 2003

Wireless Networks, Volume 9 Issue 5

Full text available: pdf(164.73 KB)

Additional Information: full citation, abstract, refe

The rapid proliferation of wireless networks and mobile computing application security. The traditional way of protecting networks with firewalls and encryption is not effective. We need to search for new architecture and mechanisms to protect computing application. In this paper, we examine the vulnerabilities of wireless intrusion detection in the security ...

Keywords: anomaly detection, cooperative detection, intrusion detection, intr

### 142 Dynamic task-based anycasting in mobile ad hoc networks

Prithwish Basu, Wang Ke, Thomas D. C. Little

October 2003

Mobile Networks and Applications, Volume 8 Issue 5

Full text available: pdf(518.68 KB)

Additional Information: full citation, abstract, refe

Mobile ad hoc networks (MANETs) have received significant attention in the numbers of tetherless portable devices, and rapid growth in popularity of wireless research community has remained focused on developing lower layer mechanisms for making MANETs operational. However, little focus has been applied on high level modeling in dynamic MANET environments. ...

Keywords: anycasting, device/service discovery, distributed application execu

## 143 Foundation of a framework to support knowledge management in the file computing

Philipp Amann, Gerald Quirchmayr

January 2003 Proceedings of the Australasian information security workshop conf

Full text available:  pdf(761.39 KB)

Additional Information: full citation, abstract, refe


In this paper we propose a framework to combine Knowledge Management a emphasizing on synchronization and adaptation issues of workflow processes proposed framework is to enable adaptive, two-way interaction between cont settings. In contrast to existing concepts, we aim at capturing active feedback *Organizational Memory*, after ...

Keywords: WfMS, adaptability, context-awareness, knowledge management, synchronization

## 144 Power conservation strategy for mobile computers using load sharing

Mazliza Othman, Stephen Hailes

January 1998 ACM SIGMOBILE Mobile Computing and Communications Review

Full text available:  pdf(1.10 MB)

Additional Information: full citation, abstract, refe

Power management is an important aspect of mobile computing. Previous wc concentrated on the hardware approach. In this paper, we propose a differen for mobile computers which is based on the concept of load sharing. User job fixed host to reduce power consumption by the CPU. Simulation results show job can extend battery lifetime by up to 2 ...

## 145 Using a coordination language to specify and analyze systems containin

P. Ciancarini, F. Franzé, C. Mascolo

April 2000 ACM Transactions on Software Engineering and Methodology (TOSE

Full text available:  pdf(306.92 KB)

Additional Information: full citation, abstract, references,

New computing paradigms for network-aware applications need specification mobile code-based systems. A coordination language provides a formal fram entities can be expressed. A coordination language deals with the creation ar their communication activites, as well as their distribution and mobility in spa PoliS offers a flexible ...

## 146 Composable ad hoc location-based services for heterogeneous mobile c

Todd D. Hodes, Randy H. Katz

October 1999 Wireless Networks, Volume 5 Issue 5

Full text available:  pdf(403.18 KB)

Additional Information: full citation, references, citings, index terms

## 147 Modeling mobile IP in mobile UNITY

Peter J. McCann, Gruia-Catalin Roman

April 1999 ACM Transactions on Software Engineering and Methodology (TOSEM)

Full text available:  pdf(344.70 KB)

Additional Information: full citation, abstract, references,

With recent advances in wireless communication technology, mobile computing research. A mobile system is one where independently executing components: the course of the computation, and where the pattern of connectivity among and out of proximity. Mobile UNITY is a notation and proof logic for specifying this article it is argued that Mobile ...

Keywords: formal methods, mobile UNITY, mobile computing, shared variables, weak consistency

## 148 Cyberguide: a mobile context-aware tour guide

Gregory D. Abowd, Christopher G. Atkeson, Jason Hong, Sue Long, Rob Kooper

October 1997

Wireless Networks, Volume 3 Issue 5

Full text available:  pdf(596.81 KB)

Additional Information: full citation, abstract, references,

Future computing environments will free the user from the constraints of the environment should take advantage of contextual information, such as position. In this paper, we present the Cyberguide project, in which we are building protocols. Knowledge of the user's current location, as well as a history of past locations, services that we can ...

## 149 Models for mobile computing agents

Sanjiva Prasad

December 1996

ACM Computing Surveys (CSUR)

Full text available:  html(3.92 KB) Additional Information: full citation, citations,

## 150 Design and analysis of an efficient communication strategy for hierarchical networks

Ioannis Chatzigiannakis, Sotiris Nikolettseas

August 2004

Mobile Networks and Applications, Volume 9 Issue 4

Full text available:  pdf(313.32 KB)

Additional Information: full citation, abstract, refer

In this work we introduce two practical and interesting models: (a) hierarchical ad-hoc networks, comprised of dense subnetworks connected by a very fast yet limited backbone infrastructure, (b) highly mobile networks where the deployment area changes in a highly dynamic way and is subject to frequent topology changes. In both models, we study the problem of basic communication, i.e., from a source node to a receiver node. ...

Keywords: ad-hoc mobile networks, average case analysis, exponential time complexity, walks, routing

## 151 New directions: A message ferrying approach for data delivery in sparse

W. Zhao, M. Ammar, E. Zegura

May 2004 Proceedings of the 5th ACM international symposium on Mobile ad hoc

Full text available:  pdf(152.16 KB)

Additional Information: full citation, abstract, refer

Mobile Ad Hoc Networks (MANETs) provide rapidly deployable and self-configuring networks for critical applications, e.g., battlefields, disaster relief and wide area sensing. In sparse MANETs where network partitions can last for long periods of time, efficient data delivery in *sparse* MANETs where network partitions can last for long periods of time, rely on the use of either long range communication which leads to rapid drain of energy or node mobility which leads to rapid drain of energy. ...

Keywords: mobile ad hoc networks, mobility-assisted data delivery, sparse networks

## 152 Challenges: an application model for pervasive computing

Guruduth Banavar, James Beck, Eugene Gluzberg, Jonathan Munson, Jeremy S.

August 2000 Proceedings of the 6th annual international conference on Mobile computing and

Full text available:  pdf(998.42 KB)

Additional Information: full citation, abstract, reference

The way mobile computing devices and applications are developed, deployed and used does not match the expectations of the user community and falls far short of the potential for pervasive computing. The mobile computing community by questioning the roles of devices, applications and the way they are used, pervasive computing is described, along with attributes of a new application model and the challenges that must be met. ...



## **153 Rule based adaptation in mobile database systems**

Olaf Zukunft

April 1997 Proceedings of the 1997 ACM symposium on Applied computing

Full text available:  pdf(770.76 KB) Additional Information: full citation, references, citings, index terms

Keywords: active database, configuration, mobile computing, mobile databas

## **154 Integrated network computing models, programming modes and softwar**

V. K. Murthy, E. V. Krishnamurthy


February 1998 Proceedings of the 1998 ACM symposium on Applied Computing

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## **155 Composable ad-hoc mobile services for universal interaction**

Todd D. Hodes, Randy H. Katz, Edouard Servan-Schreiber, Lawrence Rowe

September 1997 Proceedings of the 3rd annual ACM/IEEE international conference

Full text available:  pdf(1.86 MB) Additional Information: full citation, references, citing

## **156 Untraceability in mobile networks**

Didier Samfat, Refik Molva, N. Asokan

December 1995 Proceedings of the 1st annual international conference on Mobile

Full text available:  pdf(1.20 MB) Additional Information: full citation, references, citings, ind

Keywords: CDPD, GSM, alias, anonymity, authentication, location privacy, mo

## **157 Using publish/subscribe middleware for mobile systems**

Gianpaolo Cugola, H.-Arno Jacobsen

October 2002 ACM SIGMOBILE Mobile Computing and Communications Review

Full text available:  pdf(92.71 KB) Additional Information: full citation, abstract, reference

The range of mobile computing applications comprises location-based service  
Middleware for these applications must effectively support the interaction of i  
decoupled processing, and mediate between potentially millions of mobile cli  
achieve with traditional client/server middleware systems. We argue that the  
addresses many of the challenge ...

## 158 Application requirements for middleware for mobile and pervasive systems

Kimmo Raatikainen, Henrik Bærbak Christensen, Tatsuo Nakajima

October 2002

ACM SIGMOBILE Mobile Computing and Communications Review

Full text available:  pdf(111.22 KB)

Additional Information: full citation, abstract, referen

In this paper, we examine the requirements for future middleware to support identify key research areas. We illustrate the research areas with requiremer projects concerning pervasive healthcare and home entertainment.

## 159 Multi-fidelity algorithms for interactive mobile applications

M. Satyanarayanan, Dushyanth Narayanan

November 2001

Wireless Networks, Volume 7 Issue 6

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Additional Information: full citation, abstract, refe

We introduce the concept of *multi-fidelity algorithms*, which revises the class having a fixed output criterion and allowing the resource consumption to vary allow the *fidelity* or output criterion to vary. We discuss how multi-fidelity alg battery life of interactive mobile applications. An extension of this idea allows *spots*: ...

*Keywords: Aura, Odyssey, adaptation, augmented reality, mobile computing, spot*

## 160 A framework for delivering multicast message in networks with mobile hosts

Arup Acharya, B. R. Badrinath

October 1996

Mobile Networks and Applications, Volume 1 Issue 2

Full text available:  pdf(438.33 KB)

Additional Information: full citation, abstract, referenc

To accommodate mobile hosts (MHs) within existing data networks, the static support stations&rdquo; (MSSs) that communicate directly with MHs, usually overall network changes dynamically as MHs connect to the static network fr at different times. Compared to their desktop counterparts, mobile hosts face bandwidth of the wireless links ...

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Mike Esler , Jeffrey Hightower , Tom Anderson , Gaetano Borriello, Next century computing: networking for invisible computing: the Portolano project at the University of Washington, annual ACM/IEEE international conference on Mobile computing and networking, p. 1-10, Seattle, Washington, United States

## ↑ INDEX TERMS

### Primary Classification:

C. Computer Systems Organization

↳ C.2 COMPUTER-COMMUNICATION NETWORKS

## [C.2.1 Network Architecture and Design](#)

↳ Subjects: Wireless communication

### Additional Classification:

C. Computer Systems Organization

↳ C.2 COMPUTER-COMMUNICATION NETWORKS

↳ C.2.2 Network Protocols

↳ Subjects: Applications (SMTP, FTP, etc.)

↳ Nouns: IP

H. Information Systems

↳ H.3 INFORMATION STORAGE AND RETRIEVAL

↳ H.3.3 Information Search and Retrieval

↳ Subjects: Search process

### General Terms:

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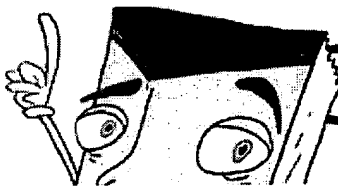


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(Smail3.2 #1) id m0zYbGa-00027DC; Wed, 28 Oct 1998 20:28:24 +0100 (MET)  
Received: from genesis for a.kupries  
with Cubic Circle's cucipop (v1.10 1996/09/06) Wed Oct 28 20:21:08 1998  
X-From: jcw@equi4.com Wed Oct 28 19:00:00 1998  
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for <a.kupries@westend.com>; Wed, 28 Oct 1998 18:59:57 +0100 (MET)  
Received: from mini.net ([207.159.134.5])  
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Wed, 28 Oct 1998 09:57:52 -0800 (PST)  
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Message-ID: <363732E1.9C3BDBCE@equi4.com>  
Date: Wed, 28 Oct 1998 16:06:09 +0100  
From: Jean-Claude Wippler <jcw@equi4.com>  
Organization: Equi4 Software - <http://www.equi4.com>  
X-Mailer: Mozilla 4.5b2 [en] (Win98; I).  
X-Accept-Language: en  
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Larry Virden <lvirden@cas.org>, Mark Roseman <roseman@teamwave.com>  
CC: elmo@onelist.com  
Subject: Dataset servers  
Content-Type: text/plain; charset=us-ascii  
Content-Transfer-Encoding: 7bit

All,

This is a restarted attempt to describe some details of what seem to be falling into place, and what I am starting to call "dataset servers".

The first start I made yesterday ended in so much handwaving (so to speak), and so much head-in-the-clouds talk that I abandoned it...

Another attempt, with about one page of context and justification, then the details of what has been set up so far and a few immediate plans.

#### THE PROBLEM

To find a way to share lists of information, such as bookmarks, FAQs, and the items we've been focusing on: patches, bug lists, several other valuable lists incorporated in "Jumbo", and Tcl-URL!.

Each of these is a dataset, with an unambiguous name, and a way to identify entries in them. Nothing new here.

The problems with today's datasets are twofold:

- How to get more people involved to maintain them. Tcl-URL! is a recent example: though others are doing the big job of compiling content, there's overhead in maintaining the infrastructure, and as long as that's manual, it will prevent everyone from being more and more productive. Automation is the only way to scale up... Content is fun, but the luggage associated with it is not.
- How to get accurate, painstakingly maintained lists, such as FAQs to as many people as possible. Grabbing a copy solves a problem now, but creates a maintenance task for the future. And I \*want\*

a copy of lists such as big reports and FAQs - on my disk. Because there are very powerful ways to browse them (read: "incrFilter").

There's another aspect, which is closely related to both problems. The web is full of lists, in HTML. Generated from some database perhaps, even dynamically (example: Scriptics), but the data is no longer easily accessible as a table of records, with a key and modification times. That's fine for a few lines of text, just grab a new copy every once in a while, but it's very inconvenient for larger amounts of information.

When someone makes some changes to in the manual pages, I'd like to get those. Not once, not every 6 months, but *\*frequently\**, and with as little effort as possible. For bugs and patches, I want a *\*very\** up to date set to browse in. After all, some packages are actively updated. The "RTFM" phrase is a response to a symptom. The underlying problem is that documentation is a *\*big\** hassle to track and maintain. Out of date documentation is worth so much less, that we all end up not using it.

#### TODAY'S SOLUTIONS

Go to the web. Always. Use the master copy and never anything else. Sure, spend a lot of time (waiting), and a lot of money (connecting)... Sorry, but this is *\*not\** a solution for most lists. Not for me.

Check on Usenet, c.l.t for example. When in doubt, post a message. Again, that's not workable: Usenet is a volatile medium. Everything of value fades away within a week or so. The result, a range of frequently asked questions (and regulars doing an unbelievably good *\*manual\** job of replying and pointing people to places where answers can be found).

Check DejaNews, the marriage of Usenet and the Web. Ahem, that's not too effective: how do you find an answer, even with a perfect search engine, in a database which is growing at the rate of a few *\*million\** messages a week... (if I may believe the sequence numbers of DejaNews).

Spider a reference web site, and store a local copy. Yes, that's an option. It can take some time to do this, and to re-scan for changes. It also is likely to break down on dynamically generated pages. I've tried this a few times - but there is no site which covers exactly my interests and not too much more. And refresh really is slow...

Rely on peers, send each other tips and hints through email. Subscribe to mailing lists and archive all emails. The trouble with this, is that email archives are not really *\*that\** useful when it's a collection of a few thousand emails, and nothing but plain text search as access method. There is too little focus, there is no organization. And it's a drag to carefully place each email in its proper spot (one?). Automated or not.

#### DATASET SERVERS

So, let's try something else. Let's make it easy for people to stay in control of the datasets they maintain (and own), while at the same time adding an infrastructure for others to get a copy, and to track changes. On the web, on servers, as databases, as HTML pages, but also as local data, available for use while off-line (most of the internet world is still very much affected by the distinction of on-line vs. off-line).

Let's give such datasets a clear identity, and let's create a mechanism whereby anyone can find the master copy, even if it moves occasionally. Let's do it in such a way that there is no central management / control.

Let's aim high, and make this approach future-proof. Usable in all sorts of contexts (including those that have not yet been created).

Let's keep our feet on the ground and start simple, with some very clear



and immediate goals. And let's keep focus on the benefits right away.

Let's treat organizations and individuals on the same level. Both as content providers, and as content consumers. Let the content be public, and available for use on websites, as well as on people's local disks.

Let's create "dataset servers".

AND THIS IS HOW

A dataset is a collection of entries (a table of records). Each dataset has a unique name. I'll use the Tcl-URL! posting archive as example, because it is furthest along in implementation.

The dataset name is: "tcl/url". It has two locations on the net associated to it:

<http://purl.org/thecliff/tcl/url.html>

and

<http://purl.org/thecliff/tcl/url>

This uses the OCLC's "Persistent URL" service. OCLC is an independent organization which sees it as its task to support and enhance archival services. They have a commitment to be around and stay around. Their PURL service is a redirection service which re-routes HTTP requests. It's similar, but much simpler than the holy grail of archival: URNs. More importantly, it works. Today. And it scales well.

The URL "<http://purl.org/thecliff/tcl/url.html>" can be entered in a web browser, and leads to a page related to the Tcl-URL! archive dataset. Its contents and meaning is merely: "this is the home of Tcl-URL!". It can be anywhere - PURLs can be adjusted if it needs to be relocated any time in the future. PURLs can never go away. The worst that can happen, is that they are set to point to a "null URL". Then the page shown will be the history of where the PURL \*used\* to point to. That history is, just like the PURL itself, permanent. Available forever.

The URL "<http://purl.org/thecliff/tcl/url>" is the core of this system. It points to a "dataset server" which must adhere to a fixed protocol. Both PURLs can point to any web server, which need not even be the same.

There are two management issues for PURLs. They can be owned by one or more people - allowing them to alter the redirection, and there are PURL domain writers, which lets people create new PURLs (again: no deletion).

The domain for this dataset is "<http://purl.org/thecliff/tcl/>". One or more people from the Tcl/Tk community will be given PURL creation access eventually, but for now I ask to postpone this until the bigger picture becomes clearer and we can agree on guidelines on when to create a new PURL and on how to choose names. Extreme restraint is needed, because there is no way to get rid of a PURL once defined. Basically, every Tcl-related dataset will be given a PURL in the /tcl/ domain.

PURL ownership is simpler. If Scriptics maintains a "patches" dataset, then it is only logical to give Scriptics the tools to decide where this dataset will be located. Every PURL can have different owners, though it may be a good idea to give a few well-known people and organizations in the Tcl community access and let them adjust resources. This is likely to happen rarely. Dataset servers tend to stay in one place. Though I'm an owner now, future owners can take me off the list later.

The differences between PURLs and domain names are:

- ownership/creation of PURLs can be distributed among many
- changes to a PURL are instant, there is no caching
- every PURL can redirect to a different site

PURLs are what make it possible to say "THE dataset name of the Tcl-URL! archive is: tcl/url". Just add a standard prefix, and you'll be able to locate its associated dataset server. Append ".html", and you'll be going to a page where all the details of that dataset can be viewed.

For now, we're aiming for the following datasets:

tcl/url	Archive of weekly Tcl-URL! posts (JC)
tcl/jumbo	Alex's resource mix
tcl/patches	Patches, maintained by Scriptics

Note that the actual \*location\* of datasets is irrelevant. There are always master copies (in this first approach), but we don't care where.

Close your eyes. How many datasets will there be a year from now?  
Answer: it doesn't matter, this can scale and is location independent.

#### BECOMING FUTURE-PROOF

So what \*is\* a "dataset"? Well, that's something I have been staying away from - because I hope to deal with this in a very generic manner.

A dataset is a collection of entries, each of which can be uniquely identified with some string (a record ID, a key field, whatever). There is no inherent ordering, though keys may imply an obvious/natural one. X

Each entry also has a "modification timestamp" as attribute.

The content of entries is unspecified. Anything goes.

A "dataset server" is what you need to be able to define such datasets in the PURL context described above. It is currently defined as a very simple HTTP request/reply service. Requests use the CGI approach of adding "?..." to the dataset URL to specify the exact request.

Replies are based on the XML (extensible markup language) notation. When you talk to a dataset server, it responds in XML. The protocol of these responses is standardized so that all dataset servers act the same, though the data itself, and their structure, will vary widely. XML is a tree-structured notation which can accomodate all formats. And the way things are moving now, XML is set to sweep the net, IMO.

XML is what will make dataset servers and clients "future proof". There is a very rudimentary server, written in Tcl, running on tclhttpd, and serving the Tcl-URL! dataset right now. It's just over 100 lines. Ten years ago, it might have been written in C (you tell me how many lines), ten years from now it can be written with a tool that doesn't exist yet. XML is transport- / system- / tool- / language- / platform-independent.

Note that XML strictly defines what is exchanged between dataset servers and future dataset client(s), but that the storage of the dataset itself is unspecified. Each one can be different. Today's datasets often are.

So what does a dataset server \*do\* exactly? Well, not that much - just enough to make the whole system work. A dataset server must be able to tell clients what has changed since the last time they checked. It does this - in response to an HTTP request - by returning a list of commands which the client needs to perform to update itself.

Here's a hypothetical transcript:

```
Client: hi, I'm new, what do you have to offer?
Server: ok, start with a clean slate, then add [these entries]
Server: the last change was on 1998/10/20 12:34:56, by the way
... time passes ...
Client: hi again, anything happened since 1998/10/20 12:34:56?
```

```

Server: oh yes, lots: add [this] as X, delete Y, replace Z with [this]
Server: FYI, the last change was on 1998/10/27 01:23:45
... time passes ...
Client: what's up, doc? I last spoke to you on 1998/10/27 01:23:45
Server: it's been a bit quiet, nothing has happened since then
... and so on ...

```

## MANAGING THE DATASETS

A lot of things depend on state changes. Servers hop from one state to the next whenever changes are made to their dataset. There are many ways in which dataset editing could be implemented. For now, I manually apply changes to the tcl/url dataset, since those are always only additions. But that will be extended soon.

One could envision Tk-based utilities which talk to a more sophisticated dataset server, identifying themselves, and applying changes from a remote location. That could be a single maintainer, or a team of people who have agreed to maintain a dataset, or eventually even an way to let anyone submit/maintain information. We'll come with many solutions.

A simpler approach, is to let the server generate HTML forms, and to let those forms interface with the server, using a CGI process or otherwise.

## SERVER PROTOCOL

We now have independence of just about anything. The one aspect which must be clearly defined, is how a server responds to requests. With this standard, servers and clients can be implemented. The protocol used is new, extensible, and maximally decoupled from content. It is also minimalistic. At least, that's what I've tried to accomplish.

In other words: dataset servers can remain simple, and will handle just about any type of data we come up with later.

There will no doubt be more extensions to the protocol in the future.

Let me translate the above transcript into what goes over the wire:

```
Client: fetch http://purl.org/thecliff/tcl/url?since=0
```

```

Server: returns the following, as mime type "text/xml":
  <update last="19981020123456000">
    <reset/>
    <add id=... modified=...>
      ...
    </add>
    ...
  </update>

```

```
Client: fetch http://purl.org/thecliff/tcl/url?since=19981020123456000
```

```

Server: returns the following, as mime type "text/xml":
  <update last="19981027012345000">
    <add id="X" modified=...>
      ...
    </add>
    <delete id="Y" modified=.../>
    <replace id="Z" modified=...>
      ...
    </replace>
  </update>

```

```
Client: fetch http://purl.org/thecliff/tcl/url?since=19981027012345000
```

Server: returns the following, as mime type "text/xml":  
<update last="19981027012345000"/>

Note that everything between <add> and </add> tags is the contents of that entry, expressed in well-formed XML notation. You can examine the real output to see what it can look like. It all resembles HTML, except that the tags do not specify formatting but datastructure.

Note also that the dataset server doesn't care \*what\* the data is. It is a rocket booster, with a payload (the data) - any payload that fits.

And that's all there is to it.

I will be adding the "modified" attribute to the XML output real soon (this change will make some neat change propagation tricks possible).

If anyone wants to experiment with this stuff on the client side, feel free to use the tcl/url dataset server. I expect Steve Ball's TclExpat and other XML parsing tools to come in quite handy to grab the contents and store it on your site. I hope to work on that a few weeks from now.

I also intend to add a larger dataset server, one which changes a few times a day, so that it will be more useful to see change propagation in action. If it turns out to be simple, maybe later this week.

Ok, shoot :)

-- JC